

# *Hydrology*

## **Precipitation**

Average annual precipitation in the basin ranges between 36 and 37 inches (Vandike 1995).

## **USGS Gaging Station**

There is one active gaging station on the Wyaconda River above Canton, MO (USGS 2001) (Table 1). There is no water quality monitoring station within the basin.

## **Permanence of Flow and Average Annual Discharge**

Average annual discharge at the gaging station is 265 cfs (Table 1). The highest recorded instantaneous peak flow at this site occurred on June 30, 1933 at 17,700 cfs. There have been many years when there was no flow. However, all of the Wyaconda River and the lower 10 miles of both the South Wyaconda and North Wyaconda rivers are classified as streams containing permanent flow (MDNR 1986a).

## **Baseflow and Low-Flow Frequencies**

Baseflows throughout the basin are not sustained by groundwater inflow during dry weather due to the low conductivity of the underlying clays and rock. Seven-day periods of no flow occur every 5 years (Skelton 1976) (Table 2). Also, stream discharge can be zero for up to 60 days or longer every 20 years (Table 2).

## **Flow Duration**

Flow duration statistics reflect the stream discharge that is exceeded for specified proportion of time. Median discharge (flow exceeded 50% of the time) for the Wyaconda River above Canton, MO is 31 cfs (USGS 2001) (Table 1). The ratio of the flow that is exceeded 90% of the time to the flow exceeded 10% of the time (90:10 ratio) is indicative of the flashiness or variability of the stream flow. The 90:10 ratio calculated for the Wyaconda River indicates that stream flows are highly variable (Table 1). Small precipitation events cause rapid increases in stream flow; most water runs off quickly due to the low permeability of the underlying soils.

## **Flood Frequency**

Alexander and Wilson (1995) determined through multiple regression techniques that drainage area and main-channel slope can be used to estimate flood frequency flows for unregulated streams in Missouri (Table 3). The generalized least squares regression equations are as follows:

$$\begin{aligned}
Q_2 &= 69.4A^{0.703}S^{0.373} \\
Q_5 &= 123A^{0.690}S^{0.383} \\
Q_{10} &= 170A^{0.680}S^{0.378} \\
Q_{25} &= 243A^{0.668}S^{0.366} \\
Q_{50} &= 305A^{0.660}S^{0.356} \\
Q_{100} &= 376A^{0.652}S^{0.346} \\
Q_{500} &= 569A^{0.636}S^{0.321}
\end{aligned}$$

where,

$Q_t$ =estimated discharge in cubic feet per second per time interval (t=years)

A=drainage area in square miles

S=main channel slope in feet per mile

Discharges in excess of 5,600 cfs occur every two years at the gaging station.

### **Dam and Hydropower Influences**

There are no major dams or hydropower influences at this time, except that the regulation of Pool 21 of the Upper Mississippi River by the Corps of Engineers can affect water level and flow in the lower portions of the Wyaconda River.

### **Major Water Users**

The city of Wyaconda, Missouri has an eight acre water-supply reservoir near the South Wyaconda River. The city also pumps water from the South Wyaconda River to supplement their water supply (Vandike 1995, Center for Agricultural, Resources, and Environmental Systems 2004). Within the basin, irrigation is used on less than 50 acres and there are no large industrial users of water (MDNR 1986a).

**Table 1. Stream discharge (cfs) for the period of record at the gage location on the Wyaconda River above Canton, MO (from USGS 2001).**

<b>Instantaneous Peak Flow</b>	<b>Instantaneous Low Flow</b>	<b>Mean</b>	<b>10% Exceeds</b>	<b>50% Exceeds</b>	<b>90% Exceeds</b>	<b>90:10 Ratio</b>
17,700	0	265	550	31	2.1	1:262

**Table 2. One through 60-day low flow discharges (cfs) at 2, 5, 10, and 20 year recurrence intervals for the Wyaconda River USGS gaging station above Canton, MO. (from Skelton 1976)**

<b>Drainage Area (sq. miles)</b>	<b>Period (d)</b>	<b>Recurrence interval (years)</b>			
		<b>2</b>	<b>5</b>	<b>10</b>	<b>20</b>
393	7	0.9	0	0	0
	14	1.2	0	0	0
	30	2.2	0.3	0	0
	60	4.5	0.9	0.1	0

**Table 3. Predicted flood discharges for 2 to 500 year intervals at USGS gaging station on the Wyaconda River above Canton, MO. (From Alexander and Wilson 1995).**

<b>Drainage Area (sq. miles)</b>	<b>Main Channel Gradient (ft/mile)</b>	<b>Flood discharge (cfs) for interval (years)</b>						
		<b>2</b>	<b>5</b>	<b>10</b>	<b>25</b>	<b>50</b>	<b>100</b>	<b>500</b>
393	4.5	5,600	9,200	11,800	15,300	18,100	20,900	27,900